

(12) **UK Patent Application** (19) **GB** (11) **2 389 130** (13) **A**

(43) Date of Printing by UK Office 03.12.2003

(21) Application No: 0305720.5

(22) Date of Filing: 09.07.2002

(30) Priority Data:

(31) 60303959 (32) 09.07.2001 (33) US

(31) 60304160 (32) 10.07.2001

(31) 60323797 (32) 20.09.2001

(86) International Application Data:

PCT/US2002/021520 En 09.07.2002

(87) International Publication Data:

WO2003/006778 En 23.01.2003

(71) Applicant(s):

Baker Hughes Incorporated
(Incorporated in USA - Texas)
3900 Essex Lane, Suite 1200, Houston,
TX 77027, United States of America

(continued on next page)

(51) INT CL⁷:

E21B 7/12 21/08

(52) UK CL (Edition V):

E1F FBC FCC FGL

(56) Documents Cited by ISA:

None

(58) Field of Search by ISA:

Other: NOT YET ADVISED

(54) Abstract Title: Drilling system and method for controlling equivalent circulating density during drilling of wellbores

(57) A drilling system for drilling subsea wellbores includes a tubing-conveyed drill bit that passes through a subsea wellhead. Surface supplied drilling fluid flows through the tubing, discharges at the drill bit, returns to the wellhead through a wellbore annulus, and flows to the surface via a riser extending from the wellhead. A flow restriction device positioned in the riser restricts the flow of the returning fluid while an active fluid device controllably discharges fluid from a location below to just above the flow restriction device in the riser, thereby controlling bottomhole pressure and equivalent circulating density ("ECD"). Alternatively, the fluid is discharged into a separate return line thereby providing dual gradient drilling while controlling bottomhole pressure and ECD. A controller controls the energy and thus the speed of the pump in response to downhole measurement(s) to maintain the ECD at a predetermined value or within a predetermined range.

GB 2389130 A continuation

(72) Inventor(s):

Peter Fontana

Peter S Aronstam

Larry Watkins

(74) Agent and/or Address for Service:

Murgitroyd & Company

Scotland House, 165-169 Scotland Street,

GLASGOW, G5 8PL, United Kingdom

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